BEACON HR/PAYROLL IMPLEMENTATION PROJECT
SCHEDULE DEVELOPMENT PROCESS

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1. INTRODUCTION

This document describes the approach required for developing a resource-loaded project schedule for the *Beacon HR/Payroll Implementation* project. This process applies not only to the initial development of a schedule, but also to later re-planning efforts. Unless otherwise stated herein, the term "schedule" is used interchangeably with the term "plan".

The project schedule is the *road-map* that every team member must follow on the project. Once developed, it must be frequently updated to maintain its value and usefulness. There can be no other plan in use on the project, although supplemental tools and processes (e.g., checklists or databases in MS Excel) may be used to track detail below the level of detail tracked in the project schedule.

A key to building and maintaining a good schedule that will accurately model the project is to keep the schedule as simple, yet realistic as possible.   Project management software has become indispensable in managing a project in all but the simplest of cases. It facilitates the organization, planning, communication, and execution of the project work. Because the topic of "schedule development" is now so closely tied to the use of a software tool (e.g., Microsoft Project), the process of going about schedule development is tightly integrated with the features, and in some cases, limitations, of the tool in use. On the Beacon HR/Payroll Implementation project, Microsoft EPM Solution is the tool of choice.

With the above background in mind, the two fundamental objectives of this document are to:

1. Demonstrate an effective and efficient process for developing a project schedule based on sound project management principles.

2. Tailor the process to the Microsoft EPM Solution tool set, specifically the Microsoft Project Professional component.

The adopted process will also be required to satisfy the requirements for measuring Earned Value on this project.

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2. SCHEDULE DEVELOPMENT APPROACH

The three *primary* process steps in developing a schedule are:

1. Detailing scope (WBS)

2. Defining dependencies

3. Assigning resources and hours (effort)

Outlining the work (creating a Work Breakdown Structure or WBS) is the first of three primary process steps in developing a schedule, coupled with preliminary estimates of task duration. This is followed by a second primary process step: identification of dependencies (predecessors and successors), which tie the project activities together. With this minimal information, a preliminary schedule or timeline can be calculated for the project by the tool. However, until resources (people and effort-hours, or *work*) are assigned, which is the third primary process step; sufficient confidence in the timeline cannot be achieved. That is because resources (number and availability) are often a limiting factor that place further restrictions on when work on the project can be performed.

Between and immediately following these three primary process steps are review/validation steps, which are performed by the project manager and business/technical subject matter experts (SMEs). These individuals perform the Quality Assurance and Control functions, and typically do not materially contribute to schedule development.

One remaining, and very important element of the schedule development process is "optimization". This occurs at least twice: 1) when the preliminary schedule has been developed; and 2) after resources have been loaded. In the first case, re-scheduling techniques are typically necessary in order to "bring back" or otherwise achieve key milestone dates. In the second case, resource capacities must be analyzed and over-allocation situations minimized. These last schedule adjustments have to be made without compromising the results of previous efforts to achieve key milestone dates, if at all possible, and can be a very challenging exercise.

At the conclusion of the above process steps, the schedule is ready for baselining, which is simply saving a *snap-shot* of key information for later comparison to the current plan for variance analysis and Earned Value calculations.

The schedule development process steps discussed above are captured in a flow chart in Appendix A, which will be frequently referenced throughout the remainder of this document. Note the amount of iteration that goes on throughout the schedule development process. This illustrates the evolutionary nature of developing a project schedule, especially a complex one, where many unknowns and resources of varied backgrounds and experience often co-exist on the project team. Projects, by definition, are unique and are the primary reason a schedule is never considered *done* – only *good-enough* for the purposes at the time.

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3. TOOL CONFIGURATION SETTINGS AND CALCULATIONS

3.1. Tool Configuration Settings

All project management software tools are developed with the broadest of audiences and working styles in mind. Standardizing on some common *tool configuration settings* and instructions help tailor the tool to a particular organization and how projects are managed. This shortens the learning curve and provides some consistency in estimating and reporting across multiple projects. Without standardizing on some common configuration settings and set of instructions, many permutations with differing results are possible.

Tool configuration settings can be found in Appendix B and are specific to Microsoft Project Professional 2003, which is one component of the Microsoft EPM Solution tool set and the one used for developing schedules.

3.2. Tool Calculations

Fundamental to project management software and particularly to the *successful use* of Microsoft Project is understanding the *Work Equation*:

$$D \times U = W$$

> Where:
>
> D = Duration (Days)
>
> U = Units (or capacity, Hrs/Day)
>
> W = Work (Hrs)

It is always active in the background and governing how calculations are made. The Work Equation may be represented slightly differently from tool to tool, but is fundamentally the same.

A second, very important concept in using Microsoft Project is *task type* and whether or not the task is *effort driven*. This concept works in concert with the Work Equation. Each detailed task in a project schedule is one of three task types at any given time, corresponding to each of the variables in the Work Equation, and each may be effort-driven. The five possible combinations are:

1. Fixed Duration, non-effort driven
2. Fixed Duration, effort driven
3. Fixed Units, non-effort driven
4. Fixed Units, effort driven
5. Fixed Work, effort driven (effort driven is the only choice for this task type)

In general, by *fixing* one of the three Work Equation variables using a specific task type, and changing a second variable, Microsoft Project will calculate the third variable. As an example of this, if a task is made a Fixed Duration type of task and the quantity of Work is changed, Microsoft Project will re-calculate the Units automatically. The key is deciding in advance which of the three variables you want to fix (protect from changing), which one you want to manually alter, and recognizing that Microsoft Project will re-calculate the third.

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On the Beacon HR/Payroll Implementation project, we are limiting ourselves to using #1 and #5, above. This will keep things simple and allow total, independent control over the calculation and re-calculation of Duration and Work.

Combined with consistent use of the adopted Microsoft Project standard settings, keeping logic (dependencies) simple and the number of constraints to a minimum, and finding the right balance of detail in the schedule; a solid and high quality plan can be developed.

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4. SCHEDULE DEVELOPMENT PROCESS

4.1. Preliminary Notes

1. Although the process steps listed below in figure 4.2.1 appear to occur in series, there is some parallel or over-lapping execution of adjacent steps, and much iteration typically occurs as the project plan is being developed.

2. Ideally, three separate technical and business reviews/validations should occur as the project plan is being developed, leading up to an initial *baseline* project plan.

3. Documenting *key assumptions* regarding scope, time, cost, resources, etc., as the project plan is being built is VERY important. Use the *Notes* feature in MS Project whenever possible. Also use the Notes feature to clarify the intent or scope of the task (or group of tasks if a summary task).

4. Estimates of task duration or work (or dates, if you think that way) should be *most-likely* estimates, neither pessimistic (worst-case) nor optimistic (best-case). This point should be stressed frequently to project team members during the gathering of information.

4.2. Process Steps

4.2.1. Preliminary Logistics
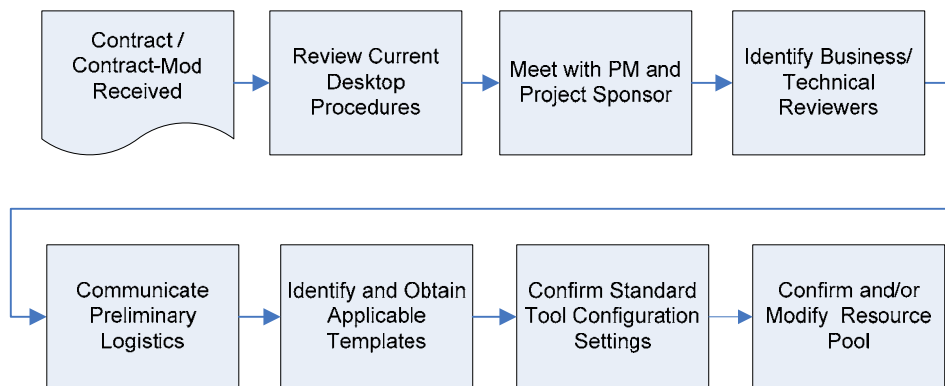
Figure 4.2.1

(Refer to Appendix A for the complete process flow diagram)

1. Determine the status of, and obtain copies of any *initiating* documents (e.g., Scope of Work, Work Authorization, Staffing Plan etc.).

2. Obtain copies of current PMO procedures related to scheduling and review.

3. Meet with the Project Manager and Project Sponsor to: a) agree on logistics; b) identify Team Leads; and c) identify the business/ technical reviewers of the project plan or plan sections.

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4. Obtain a copy of any appropriate template, if available, as a starting point.

5. Confirm Microsoft Project background configuration settings (see Appendix B - "Microsoft Project 2003 Configuration Settings…") and work calendar. We are applying a standard 4 x 10 calendar to the Beacon HR/Payroll Implementation project.

6. Determine the status of the resource pool, and how recent it has been updated (i.e., will it contain all of the resources that you will likely want to later assign?).

4.2.2. Develop a Detailed WBS
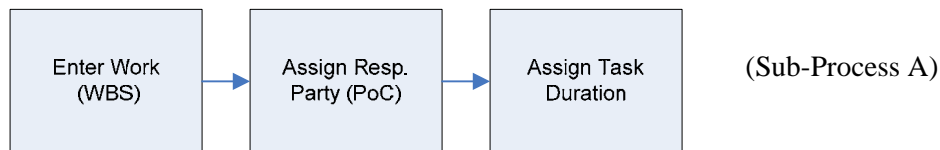
Figure 4.2.2.1

As shown in figure 4.2.2.1, enter the scope of work via the WBS (i.e., outline the work), which will consist of high-level summary tasks, detailed tasks (where resources and work are assigned – the *Work Packages*), and milestones.

Milestones are typically used to mark either the beginning or end of a work segment. They can also be used to *wrap-up* the completion of a group of tasks solely to facilitate a later step in the procedure where dependencies are assigned, since dependencies should not be tied to summary tasks even though Microsoft Project will allow you to do that. The ability to tie dependencies to summary tasks is a nice feature, but it makes it very difficult to check for *open ends* in the network.

Another consideration is the amount of detail to build into the schedule. You want to consider the tradeoff between manageability vs. visibility. You want to build a schedule that is easy to maintain yet provides timely indication of trouble spots. In other words, if the schedule is at too high of a level, you run the risk of not seeing late tasks soon enough, and if the schedule is very detailed it will be difficult and time consuming to manage. Keep in mind that this is something that is relevant during both the development and management of the schedule.

Consider the following factors:

1. Time horizon (near term tasks can/should have more detail)

2. Expertise/familiarity with the person doing the work

3. Critical path (more detail)

4. Risk associated with task (more detail)

5. The nature of the work (less detail for routine work, more detail for unfamiliar work)

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6. The ability to derive estimates (duration or work)

7. The ability to clarify and effectively communicate assignments

8. The ability to effectively track task completion progress

See Appendix C - "Task Duration Guidelines" for additional guidance.

Assign a Point-of-Contact (PoC) to each WBS line item (summary tasks, detailed tasks, and milestones). See Appendix D for a definition of PoC.

Assign task durations (typically in *days*), but only to non-summary-level tasks. These are referred to as d*etailed tasks* or *sub-tasks*, and are the tasks where resources and work will later be assigned (Work Packages).

Obtain business and technical reviews/validations of the work scope (WBS) (see Appendix A for complete process flow diagram).

The reason for this *checkpoint* is that your next step (see below) involves considerable thought and effort in the whole planning process, so if you don't get the task list outlined reasonably well to begin with, you will end up doing a lot more re-work later.

4.2.3. Develop a Preliminary Schedule (non-resource loaded)
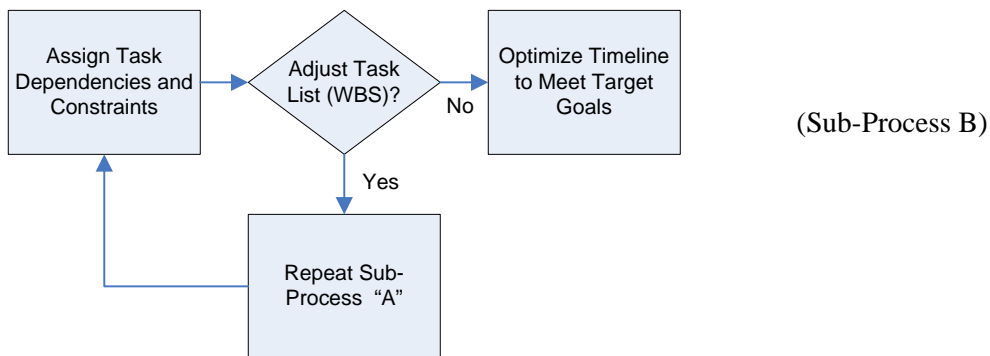
Figure 4.2.3.1
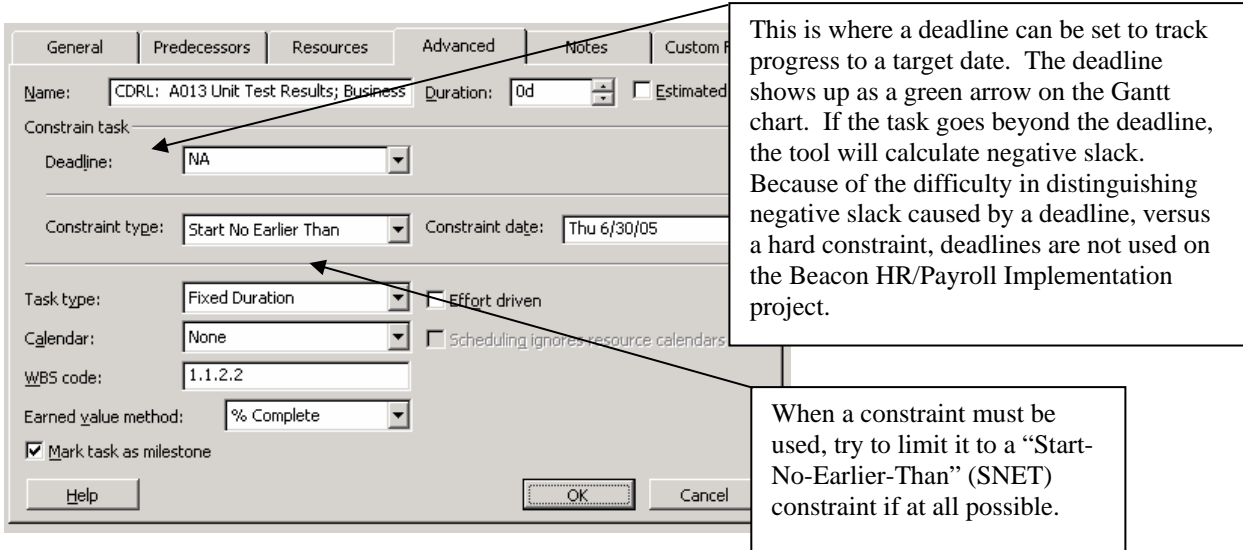
As shown in figure 4.2.3.1, assign dependencies and constraints (network logic) between detailed tasks, including milestones; but do not assign dependencies to summary tasks. All need at least one predecessor (other than the first) and one successor (other than the last). It helps to have a start and finish milestone for the plan, so that you can use them to tie dependencies to when it makes sense.

Dependencies are the logical relationships inherent in the way the work is performed, assuming unlimited resources. There are four types:

- Finish-to-Start (FS)

- Finish-to-Finish (FF)

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- Start-to-Start (SS)

- Start-to-Finish (SF) (seldom used).

To set a constraint, select the appropriate task, double-click to get the Task Information window, and select the "Advanced" tab:

This is where a deadline can be set to track progress to a target date. The deadline shows up as a green arrow on the Gantt chart. If the task goes beyond the deadline, the tool will calculate negative slack. Because of the difficulty in distinguishing negative slack caused by a deadline, versus a hard constraint, deadlines are not used on the Beacon HR/Payroll Implementation project.

When a constraint must be used, try to limit it to a "Start-No-Earlier-Than" (SNET) constraint if at all possible.

Assigning dependencies requires considerable up-front thought and work, but once done, the project plan will adjust dynamically.

Optimize the schedule for time. If dates for key milestones or end-of-project results in a finish date that is unacceptable, you should try to bring these dates back.

At this point your options are limited to: 1) *fast tracking*, which is scheduling tasks in an overlapping fashion that are normally done sequentially; 2) reaffirming task durations in relation to the work planned, and perhaps shortening some; or 3) cutting back on scope. You can fast-track by changing finish-to-start relationships to start-to-start with lag, finish-to-finish with lead, or (most simply) finish-to-start with lead. Be aware that fast-tracking can result in resource over-allocation (see later). Also, make sure you are focusing on critical path tasks only!

Obtain business and technical reviews/validations of the preliminary schedule.

Here again, the purpose of this checkpoint is to minimize re-work later by gathering any input or comments *now*, prior to adding resources and work assignments (next steps), which is a significant effort. It also helps to achieve *buy-in* to the schedule at this point.

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4.2.4. Develop a Resource-Loaded Project Plan from the Preliminary Schedule
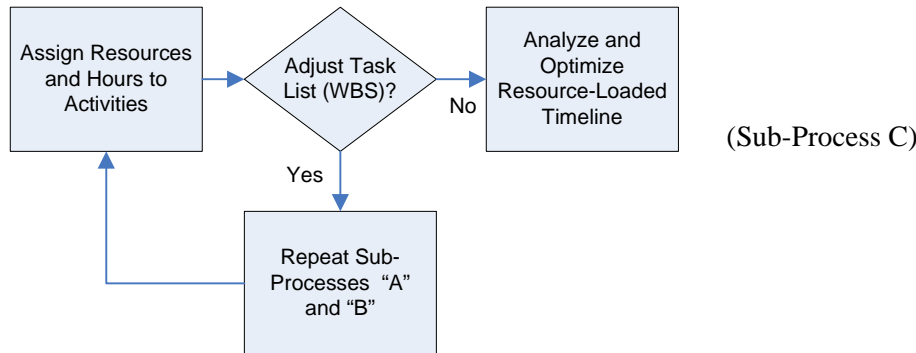
Figure 4.2.4.1

As shown in figure 4.2.4.1, build the list of resources in the Resource Sheet to the extent possible. For the Beacon HR/Payroll Implementation project, these will have been pre-determined and will consist of current team member names as well as generic resources representing broad skill sets. We will assume a 4-day, 10hr/day workweek at 100% resource capacity (10 hrs/day). This is the time that a resource has available to actually work on project-specific tasks.

Assign resources and work to each detailed (lowest level) task. Do not make assignments to summary tasks or milestones, because this causes MS Project to misrepresent resource demands and it incorrectly performs certain other operations, such as resource leveling.

The maximum capacity for a resource should not be exceeded on any individual task to which the resource is assigned; otherwise resource over-allocations (next step) can never be sufficiently resolved.

Analyze and optimize the resource-loaded project plan, at least minimizing, if not eliminating, all resource over-allocation instances.

Re-visit the Resource Sheet to verify that the maximum units for each resource are set correctly. Use the automatic leveling tool in MS Project to re-allocate resources by task, group of tasks, or for the entire project. However, do not use this feature unless leveling Priorities have been previously assigned to tasks to assist with the leveling algorithm. The automatic leveling feature may not produce the desired results, so be prepared to un-do the action and resort to manual techniques.

Note: The automatic leveling feature in MS Project can only delay the start of tasks; it cannot otherwise move them forward (or backward for that matter) in time.

Following are some options on how to manually address resource over-allocation:

1. Verify the accuracy of task duration and work estimates (no padding, especially on the critical path)
2. Re-assign work to other available team members

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3. Add other resources, internal or external (factor in learning curve and cost implications)

4. Re-schedule a task by:

   a. Adding resource dependencies
   b. Adding lead or lag to dependencies
   c. Adding constraints

   Work within the free slack first, then within the total slack, and be careful of critical path implications.

5. Increase task durations (be careful of critical path implications when optimizing for time)
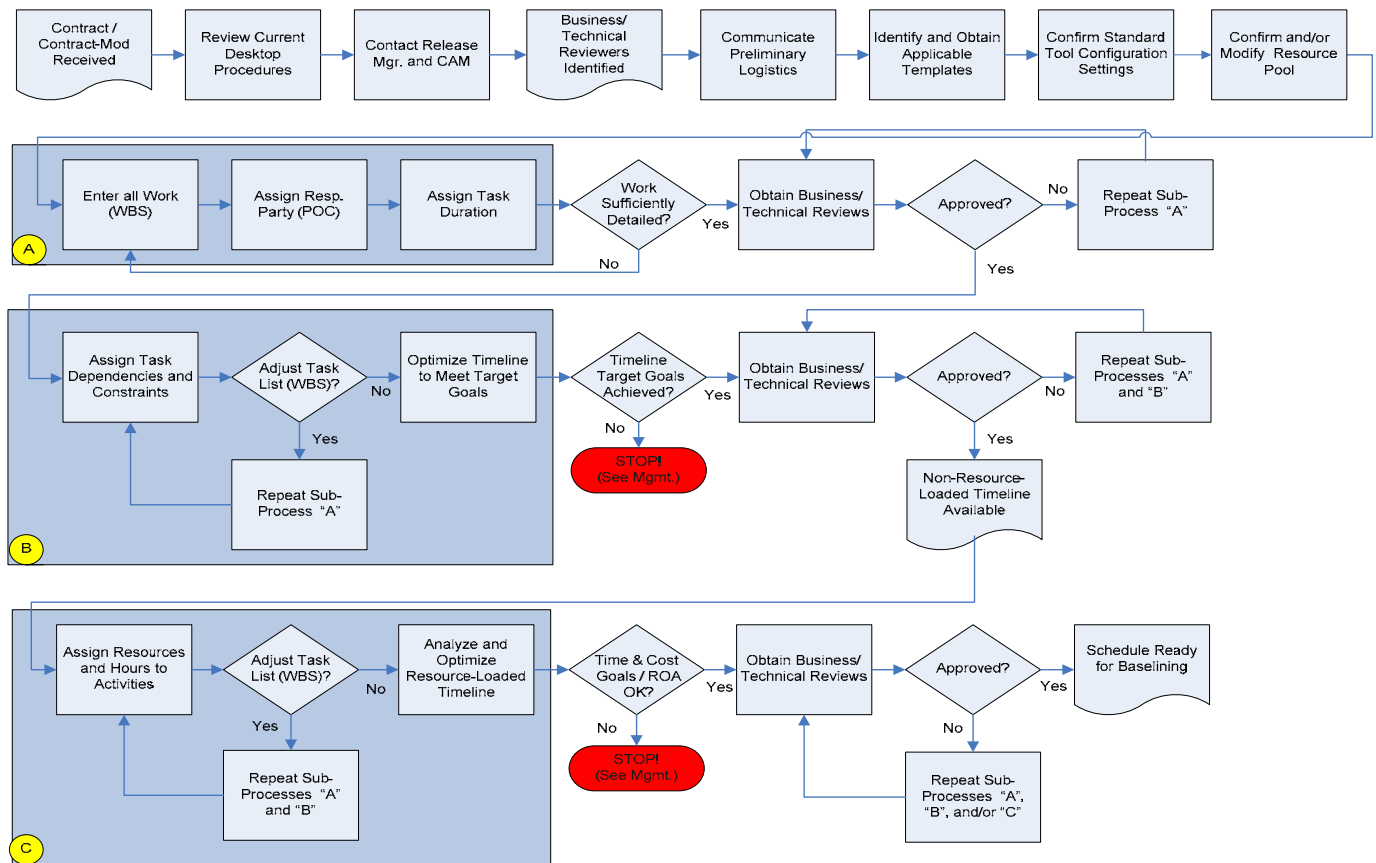
6. Cut back on *discretionary* scope, if any is currently planned into the schedule

Apply mandatory and non-mandatory custom field and outline code values to tasks in accordance with the project plan Data Dictionary.

Obtain business and technical reviews/validations of the resource-loaded project plan. Now and only now is the project plan considered to be reasonably representative of the project work and project resource demands, so this final review step is important!

Baseline the project plan by saving a version for later comparison with the *current plan* and for subsequent Earned-Value analysis purposes.

Additional guidelines on scheduling specific to the Beacon HR/Payroll Implementation project are contained in Appendix E.

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APPENDIX A - Schedule Development Process Flow Chart

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DRAFT FOR DISCUSSION ONLY

APPENDIX B - MS Project Professional 2003 (Client) Configuration Settings
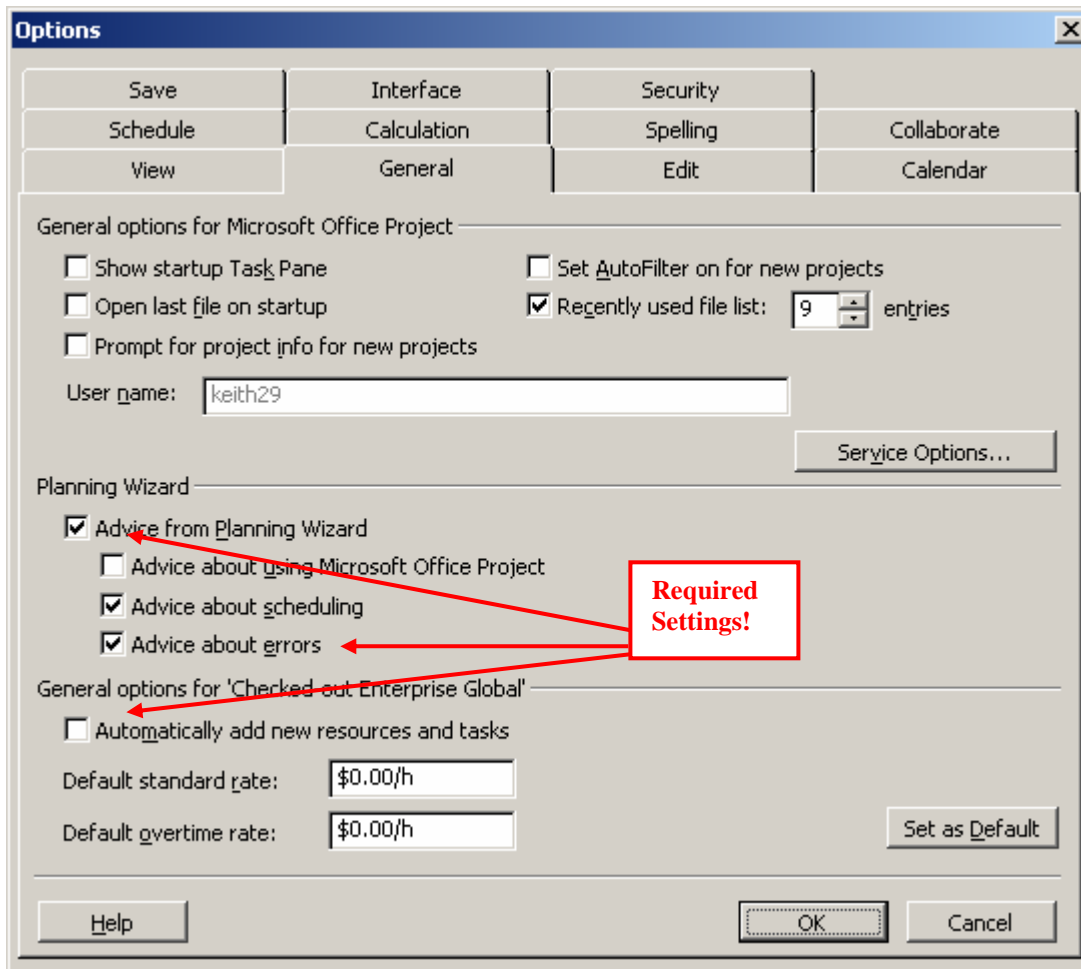
The following screen shots capture recommended standard settings for Microsoft Project Professional 2003:

From the main menu: Tools/Options…
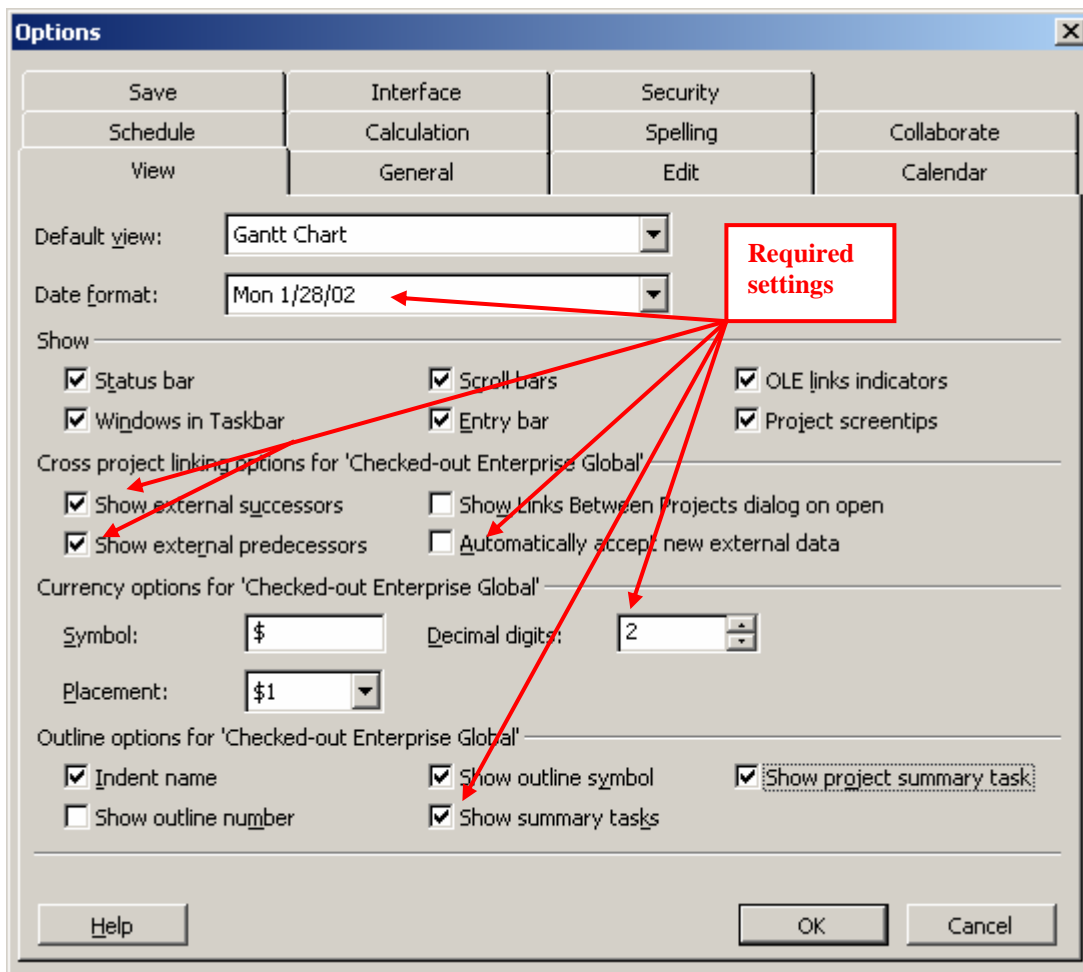
Notes:
1. "Show project summary task" can be turned on and off by the user at will, but by default, it should initially be displayed.

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Note:
1. "Allow cell drag and drop" is important because it allows the user to move some tasks around in the plan without altering the Unique ID associated with the task. Using Cut/Paste will *not* preserve the Unique ID; a new one will be assigned.

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Required Settings! A custom 4-day, 10-hr/day calendar is employed on the Beacon HR/Payroll Implementation project.

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Notes:
1. **The default task type will be Fixed Duration, with effort-driven *unchecked*.** However, task type may have to be changed prior to making a change to a task's duration, units, or work in accordance with the work equation: $D \times U = W$.

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Macro Security (see previous screenshot):

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Schedule Development Process
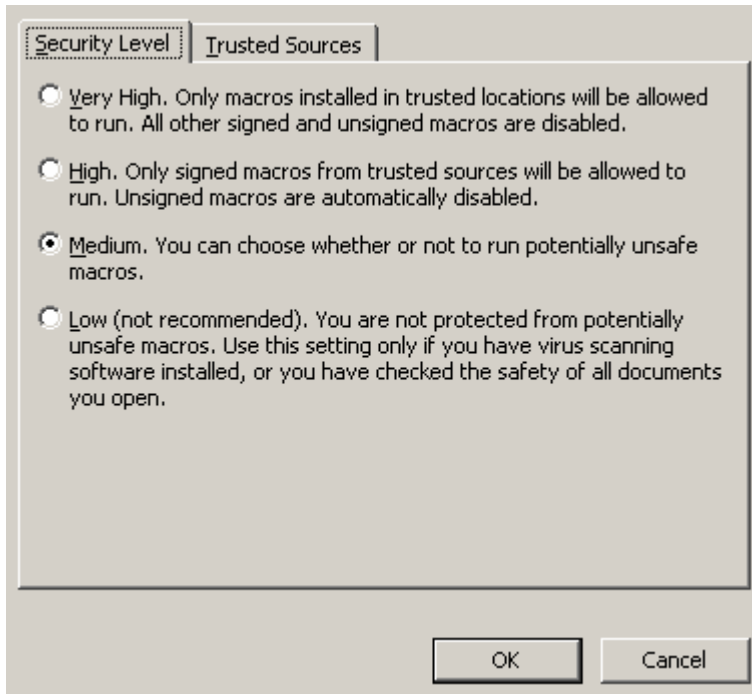
From the main menu: Tools/Level Resources…

Notes:
1. The "Look for over-allocations on a ...basis" affects when the over-allocated resource indicator in the indicator column is triggered, which also causes the resource to be displayed in red.

Questions regarding these settings may be directed to the PMO.

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APPENDIX C - Task Duration Guidelines

In general, planning should occur to the level of detail necessary to facilitate the definition, estimating, communication, and management of the work. Specific guidelines follow.

- The scope of the activity must be clearly understood and *visualized*. Know what *done* looks like
- The level of work associated with the activity must be reasonably quantifiable
- Fewer resources (e.g., 1 or 2), as opposed to more resources (e.g., 3 or more), are able to complete the activity
- Level of detail facilitates the communication of assignments and the gathering of updates
- High-risk activities need to be defined in greater detail (and scheduled as early as possible)
- Poorly understood activities need to be scheduled in greater detail (paradoxically) than work that is well understood and/or routine

Goal: Near-term work (e.g., Blueprint Phase) should be sufficiently detailed so that individual activity durations generally do not exceed 2 weeks or roughly 80 hours of work, without justification[1].

Activities in later phases may initially be less detailed and have correspondingly longer durations, but should reflect the total amount of work expected (duration and effort).

[1] This guideline is based on the following considerations:

- Activities with durations greater than the update/review cycle will have less visibility into actual activity progress. In a worst-case scenario, progress may not be reliably assessed until nearly two (2) update cycles after the start of the work. By that time, it will be too late to take meaningful corrective action if actual progress is less than what it was believed or reported to be.

- It is more difficult to reliably estimate task durations and effort associated with longer duration tasks.

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APPENDIX D - Definition Of Point-Of-Contact (POC)

Definition is as follows:

- A single party that has been delegated responsibility by the PM (or Team Lead) for the completion of a single task (or group of tasks)

- A party sufficiently knowledgeable about the work required to complete the task

- The person that the Project Manager (or Team Lead) can contact during the planning phase to help define the work and who should work on the task. It is also the person who can later provide updates back to the Project Manager on the status of work on that task

- The PoC may or may not actually contribute to the completion of work on that task.

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APPENDIX E – **Scheduling Guidelines**

1. Standard, agreed-to configuration settings are set for the tool (Microsoft Project) and are maintained in each schedule.

2. All work and deliverables to be completed for the project are represented in the task outline (WBS) structure.

3. Task names are reasonably descriptive of what work has to occur, or what deliverable has to be produced, and include action verbs.

4. Estimates, whether it be duration or work, are *most-likely* (to occur) estimates. Best-case (optimistic) and worst-case (pessimistic) estimates certainly may be considered, but only the most-likely estimate is entered into the tool.

5. Task durations are not reflected as *estimated* (by the tool) and are not excessively long. For the Beacon HR/Payroll Implementation project, the **maximum** task duration should not exceed 1 to 2 calendar weeks (40-80 hours of work). Occasional exceptions may be warranted, but should be explained in a *Note* attached to the task if not intuitive.

6. All detail tasks and milestones have at least one predecessor and one successor dependency assigned, other than the project start milestone (no predecessor) and the project finish milestone (no successor). **Dependencies are not assigned to summary tasks!**

7. Use of constraints, in general, is absolutely minimized and *hard* constraints are avoided. Where a constraint must be applied, try to limit it to the *Start-No-Earlier-Than* (SNET) constraint, if possible. Strive to keep the schedule as a whole as *dynamic* as possible, where dates are free to *float* (be re-calculated by MS Project) in response to changing conditions.

8. Task Type is restricted to using only Fixed Work or Fixed Duration (non-driving) type tasks, alternating as necessary to *protect* these two variables at any given time as changes are made to the schedule. Remember that in changing from Fixed Work to Fixed Duration, Microsoft Project automatically checks the Effort Driven option, *which must be un-checked*.

9. All detail tasks have resources and work assigned, and no single assignment of a resource on a task exceeds the default maximum capacity (100%) set for that resource in the resource pool. **There are no resources or work assigned to summary tasks or milestones.**

10. If the PMO later approves Team Leads for assigning resources to tasks from their desktop client (as opposed to drawing from a pre-established resource pool on Project Server, the following resource naming convention **must be used**: *Last Name First Name* (ex: Bandt Keith)

11. Milestones all have *zero* duration and **do not have resources or work assigned**.

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12. If negative float occurs in the schedule at any time, immediate steps are taken to minimize and ultimately eliminate this condition.

13. Task Duration and Total Work are whole numbers (do not contain fractional amounts) at all levels of the WBS. This is a QC mechanism, tied to consistent use of either Fixed Work or Fixed Duration (non-driving) task settings).

14. Key, task-specific assumptions regarding scope, time, cost, resources, work effort, or other clarifications are documented in the schedule using the *Note* feature. The note may also refer to an external, supplemental document, as necessary.

15. The *Deadline* feature in MS Project is not used. It generates negative slack in the schedule but still allows work to be scheduled past it. This negative slack is impossible to distinguish from true negative slack caused by a hard constraint, or in other cases, by completing tasks out-of-sequence.

16. Tasks are not *split* (started, stopped, re-started, etc.).

Questions regarding these guidelines may be directed to the PMO

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